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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,323	08/28/2003	Norman Herron	UC0220 US NA	6878

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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

DATE MAILED: 10/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/650,323

Applicant(s)

HERRON ET AL.

Examiner

Marie R. Yamnitzky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 Aug 2003, 14 Jun 2004 and 24 Feb 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date rec'd 14 Jun 2004 and 24 Feb 2005.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

1. The drawings are objected to because the details in Figure 2 are too unclear to be accurately reproducible. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

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3. The abstract of the disclosure is objected to because it is not in single paragraph form and includes phrases which can be implied. Correction is required. See MPEP § 608.01(b).

4. The disclosure is objected to because of the following informalities:

Formula II as set forth on page 5 contains an obvious error in the double bond structure of the five-membered ring. Based on the definition of A, the double bond presently shown between A and CR¹ should instead be shown between the two CR¹.

Appropriate correction is required.

5. Claims 6, 7, 10, 13-16, 18 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Formula II as set forth in claim 6 contains an obvious error in the double bond structure of the five-membered ring. Based on the definition of A, the double bond presently shown between A and CR¹ should instead be shown between the two CR¹.

Claims 10, 18 and 23 set forth "hydrides" as a member of the group from which is ligand may be selected. The use of the plural is confusing. It is not clear what ligands applicant considers to be within the scope of "hydrides", other than "-H".

The meanings of the abbreviations PBz₃, PPh₂Bz and PPh₂ are not set forth in the claims.

In claim 15, it is not clear if the phrase “and further comprising two PPh_2 ” is further defining the second ligand, or if the two PPh_2 are components of the composition that are distinct from the second ligand.

Proper antecedent basis is lacking for “ L^2 ” as recited in claim 16. (For purposes of comparing to the prior art, the examiner will presume that L^2 refers to the at least one second ligand.)

6. Regarding claim interpretation:

In the phrases “nitrogen on a heteroaromatic ring” and “carbon atom on an aromatic group” (as recited, for example, in the sixth and ninth lines of claim 1), the examiner interprets “on” as meaning --of--.

The examiner notes that ligands that meet the limitations for the first monoanionic bidentate ligand also meet the limitations of the second ligand wherein the second ligand is coordinated through a carbon which is part of an aromatic group. The independent claims do not explicitly require the second ligand to be different from the first monoanionic bidentate ligand.

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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8. Claims 1-8, 10, 11 and 17-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Igarashi et al. (US 2001/0019782 A1).

Igarashi et al. disclose iridium complexes having at least two monoanionic bidentate ligands coordinated through a nitrogen of a heteroaromatic ring and a carbon of an aromatic group. These at least two ligands meet the limitations of the at least one first monoanionic bidentate ligand and the at least one second ligand coordinated through a carbon atom as required by the present independent claims.

Each of Igarashi's specific iridium complexes represented by the formulae set forth on pages 10-17 and 22-24 meet the limitations of the luminescent organometallic complex composition as defined in present claim 1 and further defined in present claims 2-5. If claim 1 were to explicitly require the first and second ligands to be different from each other, Igarashi's iridium complexes represented by formulae (1-15), (1-26), (1-28), (1-41), (1-51), (1-56), (1-59), (2-9), (2-11), (2-14), (2-15), (2-17) and (2-20) would still meet the limitations of the composition as claimed in claims 1-5.

Many of Igarashi's specific iridium complexes meet the further limitations of present claims 6 and 7. For example, Igarashi's compound of formula (1-1) has three phenylpyridine ligands of present formula I. Igarashi's compound of formula (1-3) has three thienylpyridine ligands of present formula II (as previously noted, present formula II has an obvious error in double bond structure). If claim 1 were to explicitly require the first and second ligands to be different from each other, Igarashi's iridium complexes represented by formulae (1-15), (1-26), (1-41), (1-51), (1-56), (1-59), (2-9), (2-11), (2-14), (2-15) and (2-20) would still meet the

limitations of the composition as claimed in claim 6, with some of these prior art complexes further meeting the limitations of the composition as claimed in claim 7.

Many of Igarashi's specific iridium complexes meet the further limitations of present claim 8. For example, the phenylpyridine ligands in Igarashi's complex of formula (1-1) are ligands having present Formula III wherein m is 0 and p is 1. The ligands in Igarashi's complex of formula (1-23) are ligands having Formula III wherein m is 1 and p is 1. If claim 1 were to explicitly require the first and second ligands to be different from each other, Igarashi's iridium complexes represented by formulae (1-15), (1-26), (1-28), (1-41), (1-51), (1-56), (1-59), (2-9), (2-11), (2-14), (2-15), (2-17) and (2-20) would still meet the limitations of the composition as claimed in claim 8.

Many of Igarashi's specific iridium complexes meet the further limitations of present claim 10, noting that the "at least one additional ligand" is not explicitly required to be different from the first and/or second ligand required by claim 1. Many of Igarashi's iridium complexes have three ligands which each form an orthometalated structure with the iridium.

With respect to present claim 11, at least Igarashi's iridium complexes of formulae (1-1), (1-2), (1-4), (1-24), (1-36), (1-41), (1-42) and (1-44) meet the claim limitations. See paragraphs [0155], [0156], [0158], [0160], [0162]-[0165] and [0172].

With respect to present claims 17-26, Igarashi's iridium complexes are used as light-emitting materials in an electronic device comprising a pair of electrodes and a light-emitting layer. The device may also comprise a layer of charge transport material between the light-emitting layer and at least one of the electrodes. For example, see paragraphs [0135]-[0150].

With respect to present claims 27 and 28, many of Igarashi's iridium complexes are compositions having a Formula IV as required by claim 27, and are organometallic complexes as required by claim 28. Igarashi et al. do not specifically disclose that any of the complexes emit blue light as required by claims 27 and 28, but the present specification teaches that "blue" indicates any color that appear bluish to the naked human eye, "including light of wavelengths ranging from 440 nm to 540 nm" (p. 3, l. 22-24). Igarashi et al. disclose complexes which provide devices that emit light having a peak emission wavelength (λ_{max}) in the range of 440 nm to 540 nm, though the color of emission is, in most of these cases, described as green. However, since the peak emission wavelength is in the range disclosed in the present specification as "blue", the prior art is considered to anticipate claims 27 and 28.

9. Claims 1-8, 10, 11 and 17-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawamura et al. in *J. Appl. Phys.* 92(1), pp. 87-93 (July 01, 2002).

Kawamura et al. disclose four iridium complexes having more than one monoanionic bidentate ligand that is coordinated through a nitrogen of a heteroaromatic ring and a carbon of an aromatic group. See Fig. 1 on page 88. The monoanionic bidentate ligands of Kawamura's iridium complexes meet the limitations of the first and second ligands required by the present independent claims.

Kawamura's four iridium complexes meet the limitations of the luminescent organometallic complex composition as defined in present claim 1 and further defined in present claims 2-5.

Three of Kawamura's four iridium complexes meet the further limitations of present claim 6. Firpic and Ir(ppy)₃ each have ligands of present formula I, and Btp₂Ir(acac) has ligands of present formula II.

Firpic and Ir(ppy)₃ further meet the limitations of present claim 7 because these complexes have phenylpyridine ligands.

Each of Kawamura's four iridium complexes meets the limitations of present claim 8 wherein m is 0 and p is 1.

Ir(ppy)₃ further meet the limitations of present claim 10, noting that the "at least one additional ligand" is not explicitly required to be different from the first and/or second ligand required by claim 1. Ir(ppy)₃ has three ligands which each form an orthometalated structure with the iridium.

Firpic and Ir(ppy)₃ further meet the limitations of present claim 11. See the λ_{max} values in Table 1 on page 89.

With respect to present claims 17-26, see the paragraph bridging the two columns on page 88 for example.

With respect to present claims 27 and 28, the device made with Firpic as the sole emitter is explicitly taught by Kawamura et al. as emitting blue light. Further, the device made with Ir(ppy)₃ as the sole emitter has a peak emission wavelength of 517 nm which, in view of p. 3, l. 22-24 of the present specification, meets the limitations of "blue" light as the term "blue" is used in the present application.

10. Claims 1-11 and 17-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Igarashi et al. (US 2002/0048689 A1).

Igarashi et al. disclose iridium complexes meeting the limitations of the organometallic complex as defined in each of the present independent claims. Igarashi et al. disclose these iridium complexes as capable of emitting blue light, and teach their use in the light-emitting layer of an electronic device comprising a pair of electrodes and a light-emitting layer. The device may also comprise a layer of charge transport material between the light-emitting layer and at least one of the electrodes. For example, see paragraphs [0001] and [0088]-0092].

Igarashi's iridium complex of formula (1-25), for example, meets the limitations of the luminescent organometallic complex composition as defined in present claim 1, and further defined in present claims 2-10.

The complex of formula (1-25) contains two phenylpyridine ligands of present formula I as shown in claim 6, with claim 7 dependent therefrom, and a ligand of present formula III as shown in claim 8, with claim 9 dependent therefrom, wherein m is 0, p is 1, Y is PR^3_2 and R^3 is Ar.

Present claim 10 does not explicitly require the "at least one additional ligand" to be different from the first and/or second ligands required by claim 1, so the two phenylpyridine ligands in the complex of formula (1-25) meet the limitations of the first ligand and the at least one additional ligand.

Since Igarashi discloses the complexes as blue emitters, it is reasonable to expect that the complex of formula (1-25) inherently meets the limitations of present claim 11.

Prior art complexes other than the complex of formula (1-25) also meet the limitations of the complex as defined in/required by each of the present independent claims and some of the dependent claims given that the present claims do not explicitly require the first and second ligands to be different. For example, Igarashi's complex of formula (1-1) meets the limitations of the complex defined in/required by present claims 1-8, 10, 11 and 17-28. With respect to present claim 27, the two A apparently do not have to be identical, and the two B apparently do not have to be identical.

11. Claims 1-8, 10, 11 and 17-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Lamansky et al. (WO 02/15645 A1).

Lamansky et al. disclose phosphorescent organometallic compounds, some of which are capable of emitting blue light. Each of the iridium compounds represented by the formulae set forth in claim 3 of the WO publication have at least two monoanionic bidentate ligands that are coordinated through a nitrogen of a heteroaromatic ring and a carbon of an aromatic group. These monoanionic bidentate ligands of Lamansky's iridium complexes meet the limitations of the first and second ligands required by the present independent claims.

For example, the iridium complex represented by the first formula in claim 3 of the WO publication meets the limitations of the organometallic complex composition as defined in present claim 1 and further defined in present claims 2-8 and 10. This prior art iridium complex also meets the emission maximum limitation of present claim 11 and the blue light requirement of present claims 27 and 28 as evidenced by Figure 7d of the WO publication.

Lamansky's organometallic compounds are disclosed for use in the light-emitting layer of an electronic device comprising a pair of electrodes and a light-emitting layer. The device may also comprise a layer of charge transport material between the light-emitting layer and at least one of the electrodes.

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1-12 and 16-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamansky et al. (WO 02/15645 A1).

Lamansky et al. disclose phosphorescent organometallic compounds comprising a transition metal and having at least one monoanionic, bidentate, carbon-coordination ligand and at least one ligand that is not monoanionic and/or not bidentate and/or not a carbon-coordination ligand. Some of Lamansky's compounds are capable of emitting blue light.

The monoanionic, bidentate, carbon-coordination ligand may be a ligand having present formula I or formula II. For example, see the second, fourth, ninth-eleventh and twenty-first formulae in claim 5, and see the second and third formulae in claim 6 of the WO publication. The second and third formulae in claim 6 represent two specific substituted phenylpyridine ligands.

The at least one ligand that is not monoanionic and/or not bidentate and/or not a carbon-coordination ligand may be a hydride such as when at least one ligand is $-R$ as in claim 7 of the WO publication wherein R is hydrogen.

The compounds may also have a phosphine ligand. The penultimate formula in claim 7 represents a triarylphosphine ligand.

Lamansky et al. do not disclose a specific example of an organometallic compound within the scope of the present claims wherein the at least one second ligand is a hydride ligand, but such compounds are clearly suggested by Lamansky's disclosure of $-R$ as a ligand wherein R may be hydrogen.

Absent a showing of superior/unexpected results commensurate in scope with the claims, it is the examiner's position that compounds within the scope of the present claims 1-12 and 16-28 having a hydride ligand would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention given Lamansky's disclosure. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make various phosphorescent organometallic compounds within the scope of Lamansky's disclosure in order to provide various compounds suitable for use as light-emitters in light-emitting devices. Guided by Lamansky's teachings regarding the effect of different ligands, it would have been within the level of ordinary skill of a worker in the art to select suitable and optimum combinations of ligands from those taught by Lamansky in order to provide organometallic compounds capable of being used in a device as taught by Lamansky.

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14. Miscellaneous:

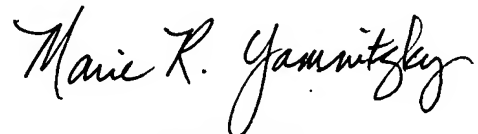
In line 2 of claim 6, "FormulaI" should read --Formula II--.

In line 7 of claim 22, "complexcomprising" should read --complex comprising--.

15. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
October 03, 2005



MARIE YAMNITZKY
PRIMARY EXAMINER

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